Greater Suttle Lake Vegetation Management Project

Fuels Specialist Report

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Existing Condition

Within the project area, two plant association groups (PAGs) exist, which are groups of plant communities occurring across the landscape based on management actions and/or lack of disturbance (Volland 1985). The Greater Suttle Lake Vegetation Management Project area consists of approximately 173 acres of wet mixed conifer PAGs and 74 acres of dry mixed conifer PAGs, however the vast majority of the project area is fragmented via several recreational areas including campgrounds, day-use areas, boat ramps, and organizational camps. Therefore, hardened recreation sites assigned a PAG should not be considered a functioning PAG from an ecological standpoint. Table 1 illustrates project area acreage broken out by proposed treatment area, which shows the proportion of the project area broken up by developed recreation. An additional two acres were mapped out in the PAG analysis layer, however those are considered to be water and are insignificant for PAG classification. Stands within the project area outside of the intensive recreational sites listed above make up a larger landscape of fire-adapted ecosystems due to the extensive fire history within Central Oregon. The project area has been largely affected by the 2003 B & B fire, in which a large portion of the landscape experienced high severity stand replacing fire.

Table 1. Proposed treatment area and subsequent acres.

Proposed Treatment Area	Acres
Link Creek Campground, Boat Ramp and Day-Use	16
South Shore Campground and Boat Ramp	29
Blue Bay Campground and Boat Ramp	14
Scout lake Campground and Day-Use	27
Suttle Lake United Methodist Camp	31
Camp Tamarack	19
Roadside	55
Roadside	52
Adjacent area	6
Total Acres	249

One fire regime exists within the project area, illustrating a semi-frequent pattern of fire occurrence across the mixed conifer landscape. A fire regime is a classification group based on frequency and character of fires on a given landscape which is influenced by factors such as vegetation, weather, and climate patterns. Fire regime 3 constitutes 100% of the acreage within the project area and occurs within a 35-100 year return interval, often burning with mixed severity. It should be noted that of the 249 acres listed as fire regime 3, potentially only 113 acres (roadside units and adjacent area) may function as an intact fire regime due to alterations in natural forest residues and fuel models from heavy recreational use and lack of natural fire occurrence in 136 acres of recreation sites. Table 2 shows the breakdown of fire regime characteristics that make up fire regime 3.

Table 2. Fire regime group by acreage and percentage of project area.

Group	Frequency (years)	Severity	Vegetation Characteristics	Project Area Acreage*	Project Area Percentage
III	35-100	Low to mixed-severity fires with some replacement severity	Dry site Ponderosa pine shifting west to the interface with dry and moist mixed conifer; low to moderate fuel loading	249	100

*Denotes actual mapping of fire regime 3 and does not include reductions in acreage from intensive recreational use.

As a result of the B & B fire, varying levels of snag hazard exist within and adjacent to the project area. A recent study projecting a 50-year trajectory of snag hazard within the B & B fire shows that the project area mostly consists of severe and extreme snag hazard to public and wildfire first responders (Dunn, et al. 2019). Snag hazard metrics developed in the study were based on snag density and height, illustrated in table 3.

Table 3. Snag hazard-rating matrix.

		Snag Density (per hectare)				
		<10	**10 to <30**	**30 to <50**	**50 to <100**	**≥100**
Snag Height (meters)	**≥30**	Guarded	Elevated	Severe	Extreme	Extreme
	20 to <30	Guarded	Elevated	Severe	Extreme	Extreme
	14 to <20	Guarded	Guarded	Elevated	Severe	Extreme
	5 to <14	Guarded	Guarded	Elevated	Severe	Extreme
	<5	Guarded	Guarded	Guarded	Elevated	Severe

Current Fuel Models

The 249-acre project area contains a variety of fuel models including grass, shrub, grass/shrub, and grass/shrub/timber litter fuel models. Table 4 illustrates a breakdown of the fuel models within the project area as well as adjectives assigned to describe rate of spread (chains per hour) and flame length in feet, using Scott and Burgan's 40 fuel models, gathered from 2014 Landfire data and ocular surveys.

Table 4. Fuels models within the project area and fire behavior characteristics.

Fuel Model/ Descriptor	% of Project Area	Fire Behavior Characteristics (Rate of spread and flame length)
SH1/Low Load Dry Climate Shrub	<1%	Very low fire spread rate and very low flame length
GR1/Short Sparse Dry Climate Grass	<1%	Low fire spread rate and low flame length
NB1/Urban/Developed	<1%	N/A
SH4/Low-Load Humid Climate Timber-Shrub	<1%	High fire spread rate and moderate flame length
TL7/Large Downed Logs	<1%	Low fire spread rate and low flame length
TU5/Very High Load Dry Climate Tim/Shrub	1%	Moderate fire spread rate and moderate flame length
TL4/Small Downed Logs	1%	Low fire spread rate and low flame length
NB8/Open Water	1%	N/A
NB9/Bare Ground	1%	N/A
TU1/Low Load Dry Climate Timber/Grass/Shrub	2%	Low fire spread rate and low flame length
TL6/Mod Load Broadleaf Litter	2%	Moderate fire spread rate and low flame length
TL8/Long-Needle Litter	2%	Moderate fire spread rate and low flame length
GS2/Mod Load Dry Climate Grass/Shrub	42%	High fire spread rate and moderate flame length

Scott and Burgan’s guide describes adjective definitions for rate of spread (how quickly a fire travels 66 feet in an hour) and flame length within each fuel model. Table 5 below defines those metrics.

Table 5. Scott and Burgan’s adjective definitions for predicted fire behavior.

Adjective Class	ROS (chains/hour)	Flame Length (feet)
Very Low	0-2	0-1
Low	2-5	1-4
Moderate	5-20	4-8
High	20-50	8-12
Very High	50-150	12-25
Extreme	>150	>25

CWPP and WUI Designation

The entire project area is considered Wildland Urban Interface (WUI), an area within or near an at-risk community, based on the high recreational use within the Suttle Lake area and nearby

Highway 20 as a critical transportation route (Greater Sisters Country Community Wildfire Protection Plan 2014). According to the plan, ½ mile on either side of major transportation/evacuation routes is considered WUI. As such, these areas are prioritized for continual hazardous fuels treatments in order to protect public and fire personnel utilizing these routes.

An analysis of the fire history within the last 38 years (1980 – 2018) shows 24 reported wildfires were ignited within the project area (½ mile buffer around the project area), all around 0.10 acres in size or smaller. All of these fires occurred within 1,000 feet of established road systems, illustrating that human-ignitions are common in this area. Of the 24 wildfires, 21 were human-caused, which is approximately 88 percent of all ignitions within the last 38 years. Figure 1 shows historical fire starts within the project area.

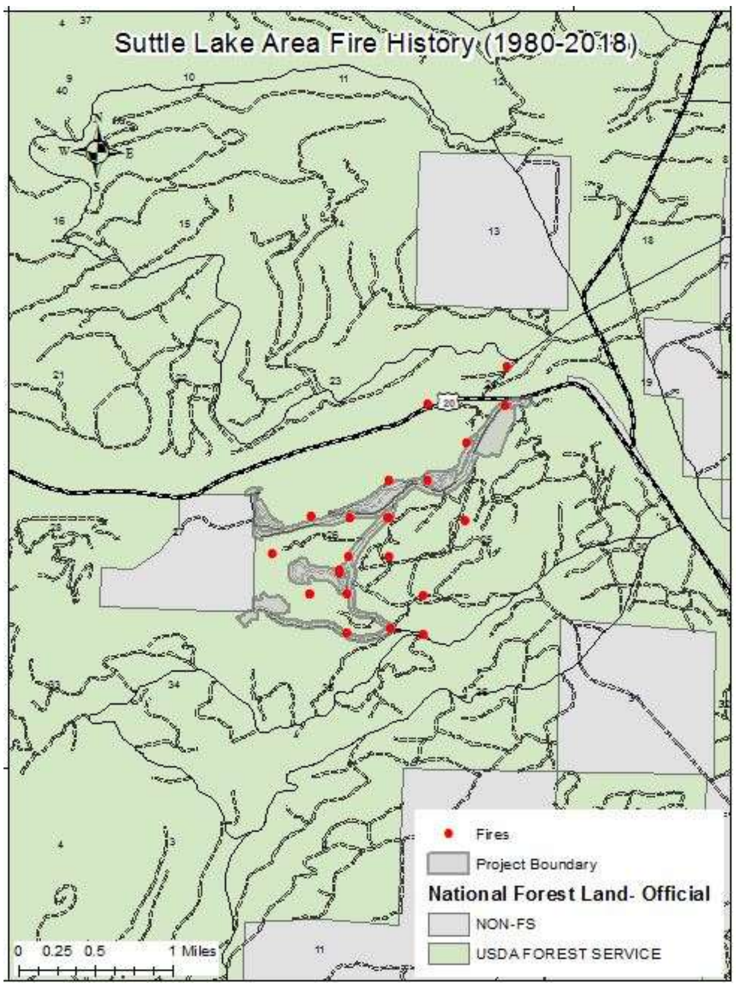

Figure 1. Fire history within Greater Suttle Lake Vegetation Management Project.

Desired Condition

Quantitative fuel loading outside of heavily recreated areas for the project area should follow Table 6 for each Management Area within the project boundary, per the Deschutes National Forest Land and Resource Management Plan (LRMP), with the exception of 32 acres of Late

Successional Reserves (LSR). Fuel loading standards and guides for LSR should follow the Metolius Late Successional Reserve Assessment (LSRA), shown in Table 7, for intact mixed conifer dry and mixed conifer wet PAGs. According to the Metolius LSRA, fuel loads within various stand types were defined as either Low (5 to 15 tons per acre), Medium (15 to 25 tons per acre), and High (25+ tons per acre). Deschutes LRMP fuel tonnage maximums are found within the Photo Series for Quantifying Forest Residues in the: Sierra Mixed Conifer Type (Maxwell, W. G. and Ward, F. R., 1979).

It should be noted that the vast majority of the project area is defined as M11, Intensive Recreation, in which 6.5 tons/acre is the maximum specified fuel loading. Current fuel loading in this management area appears to be three times the specified standard in the Deschutes LRMP. Due to the fact that much of the project area, approximately 136 acres, sees heavy recreational usage on an annual basis, it is appropriate to utilize qualitative standards within the LRMP to govern fuel loading standards throughout these areas. The LRMP states that in areas within sight distance of campgrounds and other high use areas (day-use, boat ramps, trails, organizational camps, etc.), almost 100 percent cleanup of activity fuels should occur. Additionally, standards and guides suggest fuels be treated quickly and to a level commensurate with the increased risk and protection of recreation values.

Within the LSR, the mixed conifer dry PAG appears to be nearly double the specified maximum for a fire climax PAG. Previous stand exams within the 249-acre project area computed that 3”+ diameter fuels averaged 15 tons/acre within each stand. Therefore, the Photo Series for Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest was used to impute <3” diameter fuel tonnage within each management area and PAG based on a series of photos taken and compared to the photo series.

Table 6. Allowable maximum fuel loading per LRMP Management Area, minus LSR acres.

Management Area	**Descriptor**	**Max. Fuel Loading (tons/acre)**	**Current Fuel Loading (tons/acre)****	**Photo Series (<3”Fuel)*****	**Total Acres (% of Area)**
M3	Bald Eagle	26	20.4	1-MC-4	3 (1%)
M8	General Forest	26	18.3	1-MC-3	12 (5%)
M11	Intensive Recreation	6.5	20.8	2-MC-3	202 (81%)

Table 7. Fuel loading range for mixed conifer wet and dry PAGs per Metolius LSRA, minus LRMP acres.

PAG	**Suggested Fuel Loading (tons/acre)**	**Current Fuel Loading (tons/acre)****	**Photo Series (<3”Fuel)*****	**Total Acres (% of Area)**
Mixed Conifer-Dry	10	18.3	1-MC-3	8 (3%)
Mixed Conifer-Wet	25	20.4	1-MC-4	24 (10%)

**Current fuel loading is an estimate based upon ocular assessments and photo series quantifying fuel loading by size class in inches and does not include live fuel.

*** Taken from the Photo Series for Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest (Maxwell, W. G. and Ward, F. R. 1980).

Along road corridors within the project area, specifically the 2066, 2070, and 2066-600 roads, past moderate and high severity fire has created canopy openings in which a 1 to 3 foot (see figure 2) shrub layer has been established. In the face of future wildfires, and under severe weather conditions, the shrub layer, coupled with large amounts of down wood, may propagate fire and result in impeded or delayed ingress/egress of evacuating public and incoming first responders.

Figure 2. Shrub layer with downed wood along the 2070 road within the project area.

Smoke Management

On National Forest Systems lands in Oregon, the authority to manage smoke emissions from management activities is given by the Department of Environmental Quality to the Oregon Department of Forestry (ODF)'s Smoke Management Program under the Oregon Smoke Management Plan (Oregon Revised Statute 477.013, OAR-629-048). Prescribed burning of forest fuels (activity or naturally generated) would comply with Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575. All burning operations associated with the Greater Suttle Lake Vegetation Management project are to be regulated by ODF in order to minimize impacts and meet criteria set forth by the Clean Air Act.

Alternatives

Under the no action alternative, no management activities would occur to mitigate danger and disease trees; thus, snag fall would continue to occur and dwarf mistletoe infected trees would continue to propagate infection. Forest Service and other designated individuals may continue to mitigate snags with an imminent threat to adjacent road systems and recreation areas, however no means of reducing accumulating fuel loads would exist beyond current planned activities and these activities would occur on a case-by-case basis. Utility lines would also not be buried within the project area.

In an action alternative, danger and disease trees along the road corridors and recreation sites would be systematically felled or pushed and associated slash related to harvest activity would be disposed of via machine piling or other means. Comparisons of maximum allowable fuel loading per management area and PAG with existing condition estimates provide a trend of future fuel loading if no slash was mitigated while the B & B fire scar continued to reach the half-life (approximately 50% snag fall of the existing snag population) for various snag size classes.

Additionally, approximately 2,500 feet of utility lines would be buried within the project area and removed from adjacent trees.

No Action Alternative

Landram, et al. (2002) found that average annual snag fall rates following initial disturbance were 7 percent for ponderosa pine and 4 percent for white fir. Large-diameter snags were found to fall at a slower rate than smaller diameter snags, however the introduction of large amounts of dead wood varying in size can be assumed to accumulate over time, especially with the confirmed presence of danger trees. Another study within the B & B fire area found that “the cumulative probability of snag fall increased with the number of years-since-fire…” (Dunn et al., 2019). In this study, the half-life estimates for medium snags (15.7 inches DBH) was 13-14 years post-fire and 22-23 years post-fire for large snags (31.5 inches DBH). Thus, it is possible that over half of the medium to large snags are available to fall or fragment within the fire area, which includes the Greater Suttle Lake Vegetation Management Project.

An increase in large woody debris on the forest floor would most likely limit the ability of mechanical equipment, such as deck mowers and masticators, to reduce surface fuel height for future maintenance of the above-mentioned travel corridors. Thus, wildfires may result in increased magnitude and intensity due to a lack of maintenance treatments over time. Soil degradation due to increased heat residency and increased burn times in large fuels is possible, potentially leading to hydrophobicity in soils and increased soil erosion (Stephens, et al. 2012).

Utility lines would not be buried and environmental variables (wind and snag fall) would continue to take place within these areas.

Action Alternative

Under the action alternative, danger trees would be mitigated within the project area and associated slash would be forwarded to landings and other designated areas where they may be burned or further utilized in the future. The only exception is coarse woody debris (CWD) left on-site due to restrictions within riparian reserves or steep slopes. Future recruitment of downed wood in areas which already exceed LRMP or LSRA thresholds would be reduced due to forwarding the trees to designated areas. The method in which trees are removed from the project area (i.e. pushing entire trees versus cutting/processing elsewhere) does not appear to affect fuel loading or the likelihood of future wildfire, as all harvest generated slash would be disposed of.

The action alternative would increase the safety margin for motorists, recreationists, and wildfire first responders, as existing threats in the form of danger and hazard trees would be mitigated under a systematic approach. “Burning increases the likelihood that all or a portion of a snag will fall, reducing opportunities to extinguish the fire immediately” (Dunn et al., 2019).

Soil degradation would occur to a lesser extent due to the lack of exposure to heat for extended periods of time. The action of burying approximately 2,500 feet of utility lines does not appear to have an effect on hazardous fuel loading or future wildfire scenarios.

Discussion

When comparing fuel loading between the action and no action alternatives, resultant fuel loading tonnages from a no action alternative would lead to higher, more exacerbated fire behavior in the face of future wildfire. Without mitigating slash resulting from snag fall, it is expected that ingress/egress times for future wildfires would be longer and soils would be exposed to higher temperatures for extended periods of time.

In contrast, an action alternative which mitigates most slash and debris from harvest activities associated with danger tree mitigation should aid in lower ingress/egress times for public and incoming first responders. Though current fuel loading throughout the project area is in excess of current standards, additional slash would not be added to the project area or adding to excessive temperatures to soils. Additionally, this alternative supports Greater Sisters Country Community Wildfire Protection Plan goals of preserving safety along current transportation routes.

Project Design Criteria

Project design criteria in relation to fuel loading following harvest of danger and infected trees should match that of the Deschutes LRMP and Metolius LSRA specifications found in Tables 6 and 7, respectively. An exception to this criteria is within site of heavily recreated areas where almost 100 percent slash cleanup should occur rather quickly.

Slash resulting from harvest-related activities which exceeds specified maximum fuel tonnages should be forwarded to specified landing areas for future burning or alternate form of disposal. Exceptions include areas where removal is not feasible, such as steep slopes or riparian reserves within 100 feet from water sources.

Locate slash piles out of view of heavily recreated areas to address visual concerns, whenever possible.

Machine piles (including landing piles) and hand piles should be built according to specifications provided during the time of contract development. Equipment must follow specified precautions commensurate with Industrial Fire Precaution Levels (IFPL) during operating seasons.

References

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